GIS Software and Data Sources for Research

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Research Analytics, Indiana University

April 3, 2018

Supplemental line if need be (example: Supported by the National Science Foundation) Delete if not needed.

ArcGIS Higher Education Site License

- https://www.esri.com/~/media/Files/Pdfs/industries/university/academic_programs/pdf/site-license-overview.pdf

Table 1A. Unlimited quantities. Teaching, Research and Administrative Use Permitted

Product	Comments
ArcGIS for Desktop	Single Use and Concurrent Use licenses
ArcGIS for Desktop Advanced	
ArcGIS for Desktop Standard	
ArcGIS for Desktop Basic	
Data and Maps for ArcGIS	
ArcGIS for Desktop Extensions	
ArcGIS 3D Analyst for Desktop	
ArcGIS Data Reviewer for Desktop	
ArcGIS Geostatistical Analyst for Desktop	
ArcGIS Network Analyst for Desktop	
ArcGIS Publisher for Desktop	
ArcGIS Schematics for Desktop	
ArcGIS Spatial Analyst for Desktop	
ArcGIS Tracking Analyst for Desktop	
ArcGIS Workflow Manager for Desktop	
ArcGIS for Mobile	
Apps for Smartphones and Tablets (Android, iOS)	
ArcGIS for Windows Mobile	

Table 1B. Unlimited quantities. Teaching and Research Use Permitted

Product	Comments
ArcGIS Data Interoperability for Desktop	Separate license available for administrative use. Available for Windows only.
ArcGIS Data Interoperability for Server	Separate license available for administrative use. Available for Windows only.
ArcPad	Separate license available for administrative use.

Table 1C. Unlimited quantities. Teaching Use Permitted

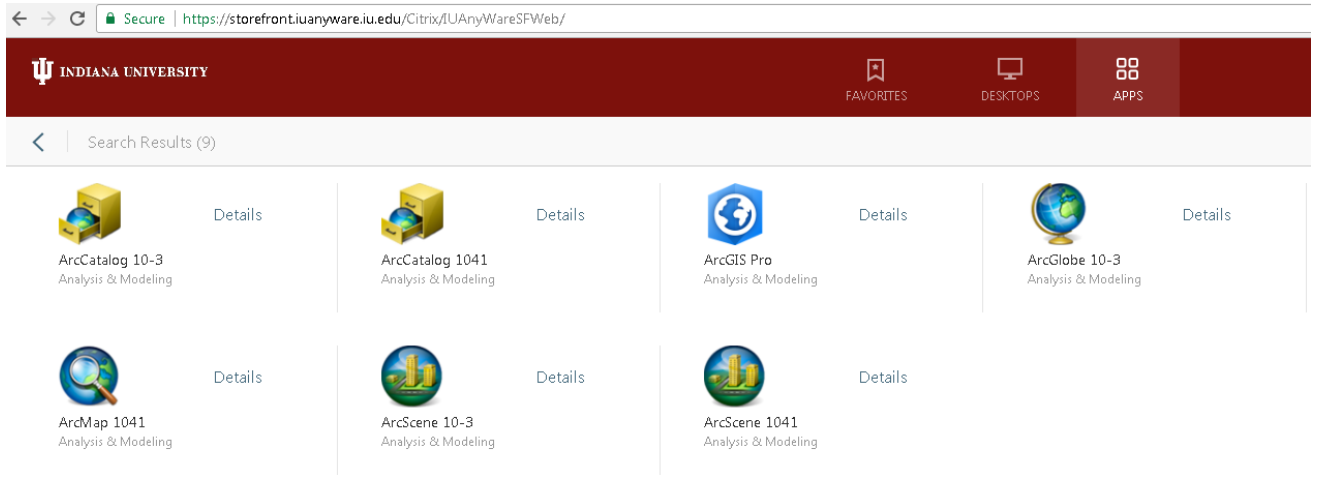
Product	Comments
ESRI Businesss Analyst Add-on to the Site License	Available on request. Available to U.S. customers only.
Esri Business Analyst Desktop	Separate license available for faculty/staff research or administrative use.
Esri Business Analyst Online and Business Analyst Online API	Separate license available for faculty/staff research or administrative use.
Esri Business Analyst Server	Separate license available for faculty/staff research or administrative use.
Esri Community Analyst and Community Analyst API	Separate license available for faculty/staff research or administrative use.

Table 2. Limited quantities. Teaching and Research Use Permitted

Product	Comments
ArcGIS Online Subscription	Number of named users varies by Education Plan Level. Separate license available for administrative use.
Esri Maps for Office	Requires ArcGIS Online subscription.
Esri Maps for SharePoint	Requires ArcGIS Online subscription.
Collector for ArcGIS	Requires ArcGIS Online subscription.
Operations Dashboard	Requires ArcGIS Online subscription.

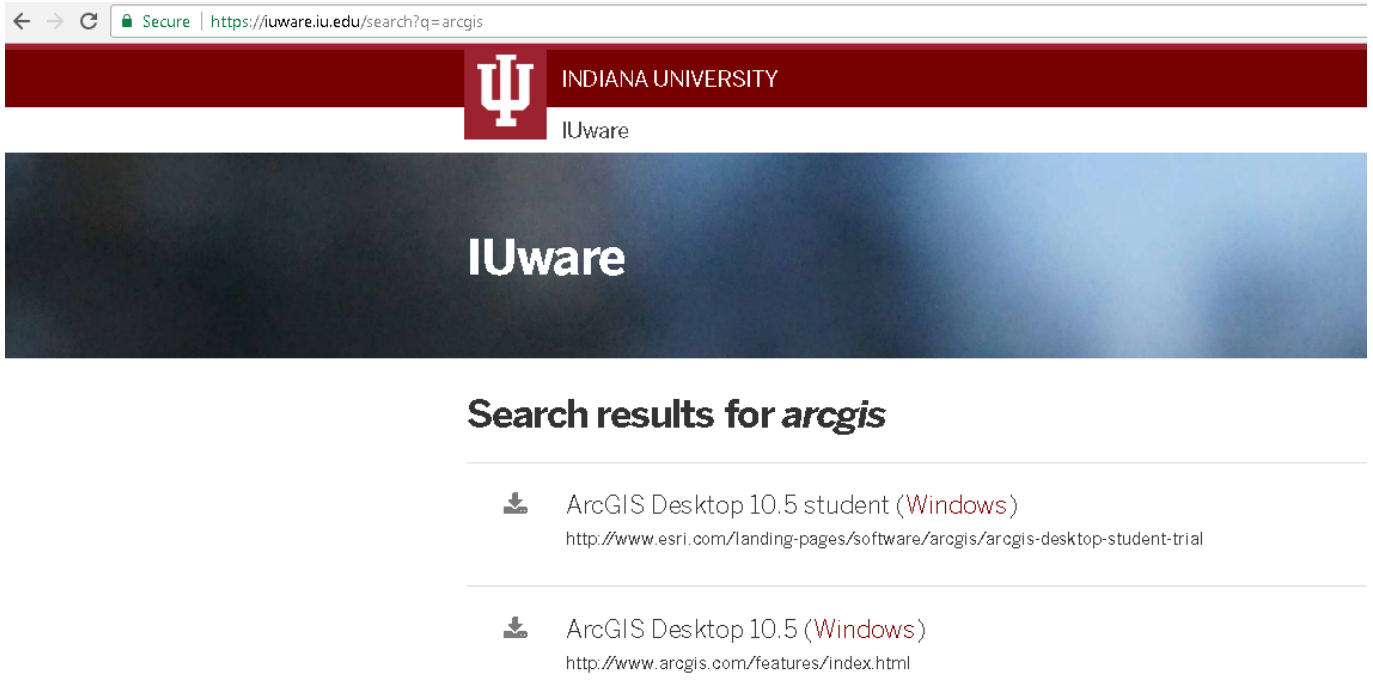
ArcGIS Desktop Availability at IU

- IUB and IUPUI STC labs (in Analysis and Modeling folder)
- IUAnyware and IU vPC builds



ArcGIS on your machine

- Students can obtain free 1 year licenses
- Staff and Faculty licenses can be purchased through IUWare ($300/license/year)



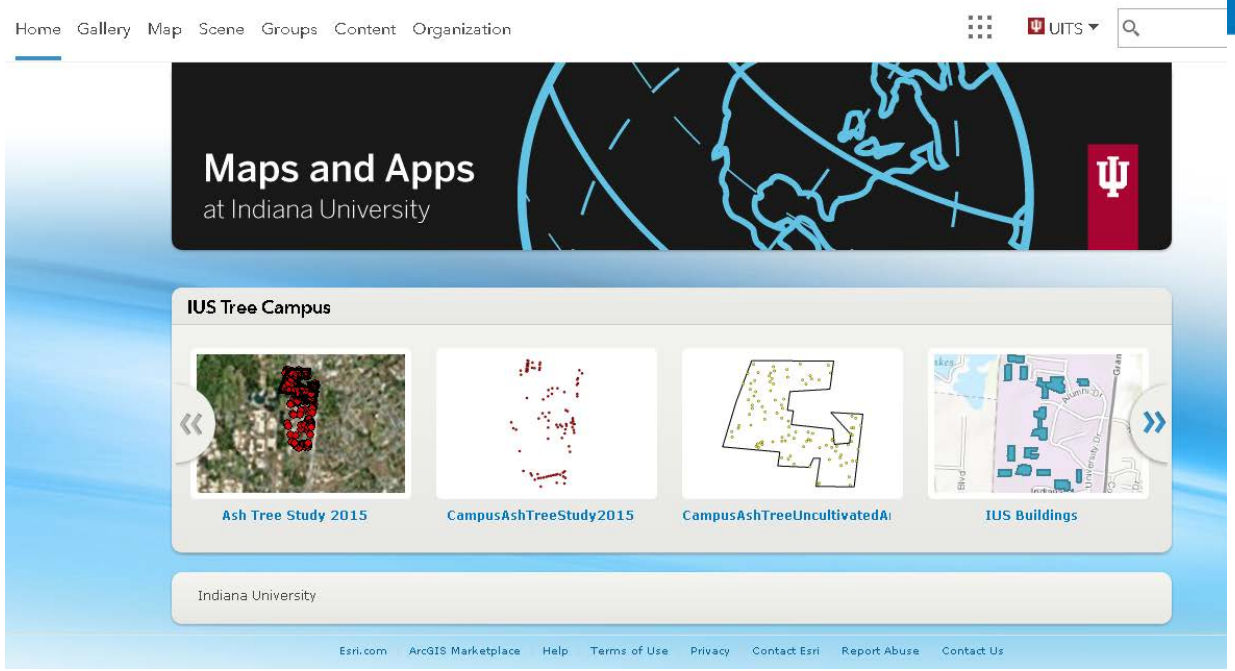
ArcGIS for state government other research partners

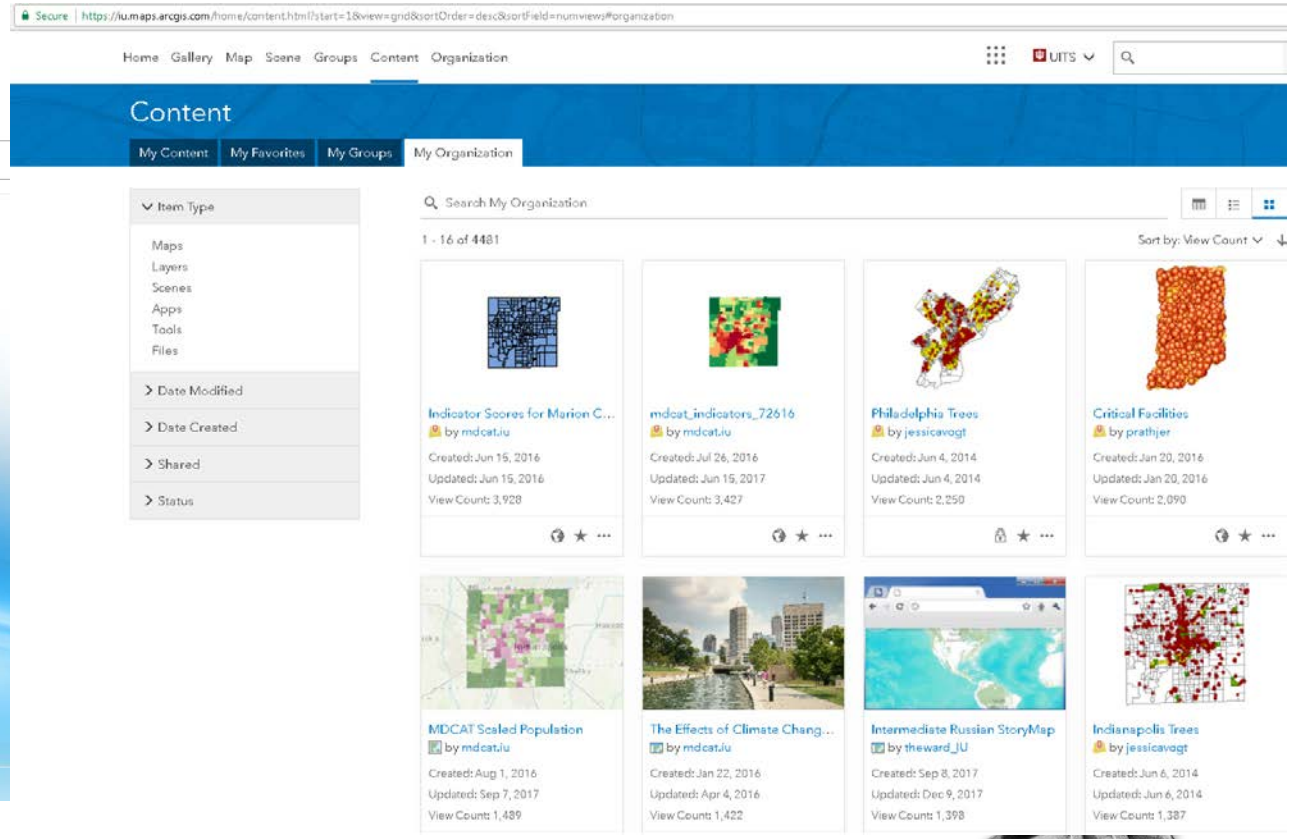
- ESRI QPA (quantity purchase agreement) with State of Indiana
- $8910.00 license purchase with $3000 annual maintenance
- http://www.in.gov/idoa/files/13097_Price_List.pdf
- http://www.esri.com/arcgis/trial

State of Indiana MPA Price List E417M—4Q2016		
Section	**Description**	**Price**
1	**ArcGIS for Desktop Software**	
1	**ArcGIS for Desktop Concurrent Use Licenses**	
	ArcGIS for Desktop Advanced Concurrent Use License	$8,910.00
	ArcGIS for Desktop Standard Concurrent Use License	$6,300.00
	ArcGIS for Desktop Basic Concurrent Use License	$3,150.00
1	**ArcGIS for Desktop Concurrent Use Licenses Maintenance**	
	Primary Maintenance for ArcGIS for Desktop Advanced Concurrent Use License	$3,000.00
	Secondary Maintenance for ArcGIS for Desktop Advanced Concurrent Use License	$1,200.00
	Primary Maintenance for ArcGIS for Desktop Standard Concurrent Use License	$1,500.00
	Secondary Maintenance for ArcGIS for Desktop Standard Concurrent Use License	$1,200.00
	Primary Maintenance for ArcGIS for Desktop Basic Concurrent Use License	$700.00
	Secondary Maintenance for ArcGIS for Desktop Basic Concurrent Use License	$500.00
1	**ArcGIS for Desktop Core Extensions Concurrent Use Licenses**	
	ArcGIS Spatial Analyst for Desktop Concurrent Use License	$2,250.00
	ArcGIS 3D Analyst for Desktop Concurrent Use License	$2,250.00
	ArcGIS Geostatistical Analyst for Desktop Concurrent Use License	$2,250.00
	ArcGIS Publisher for Desktop Concurrent Use License	$2,250.00
	ArcGIS Tracking Analyst for Desktop Concurrent Use License	$2,250.00
	ArcGIS Data Interoperability for Desktop Concurrent Use License	$2,250.00
	ArcGIS Network Analyst for Desktop Concurrent Use License	$2,250.00
	ArcGIS Schematics for Desktop Concurrent Use License	$2,250.00
	ArcGIS Workflow Manager for Desktop Concurrent Use License	$2,250.00
	ArcGIS Data Reviewer for Desktop Concurrent Use License	$2,250.00

Other esri higher education site license benefits

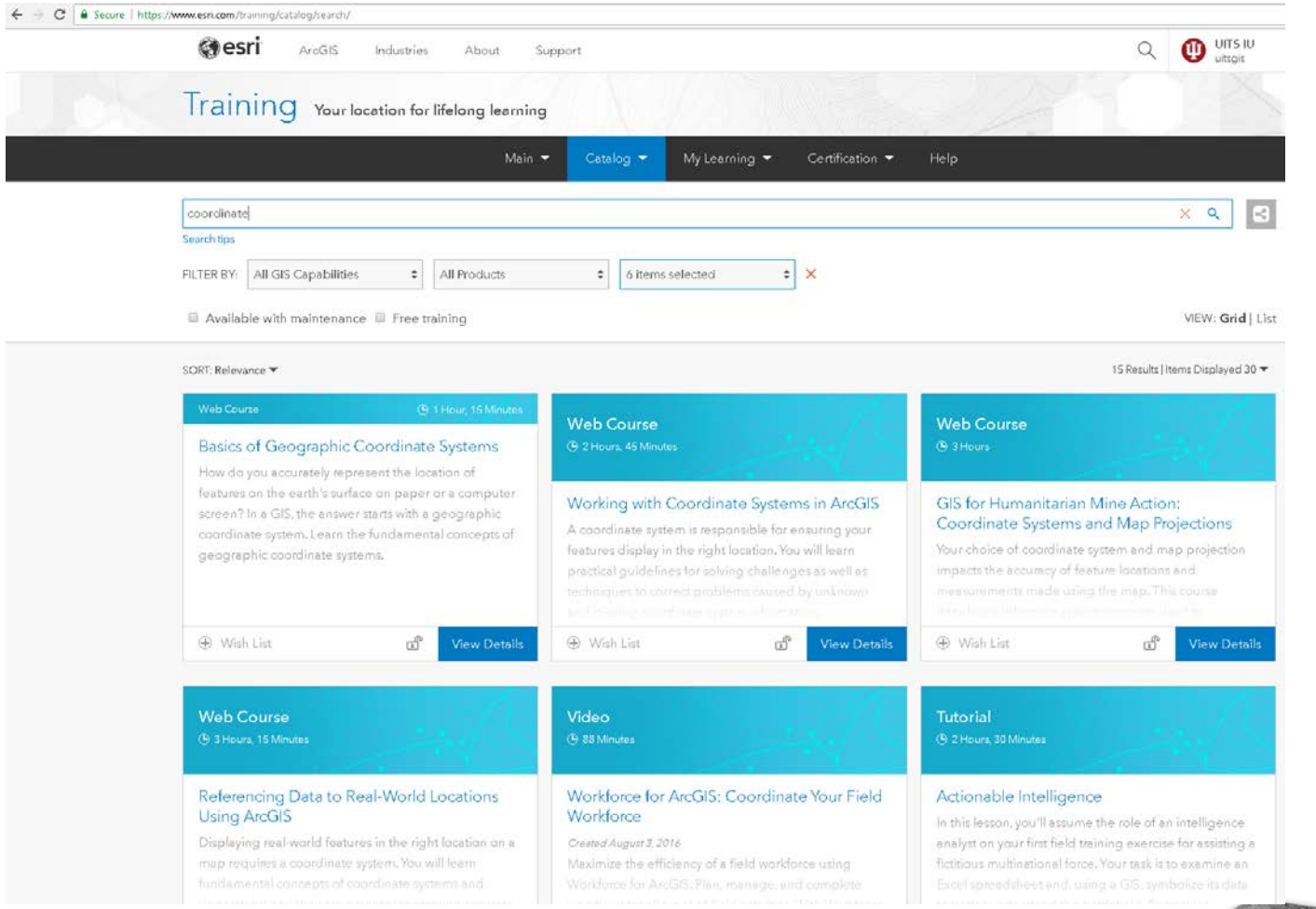
- ArcGIS online including business analyst online and community analyst online
- At IU, what is ArcGIS Online, and how do I create an account? https://kb.iu.edu/d/aoaa
- http://iu.maps.arcgis.com





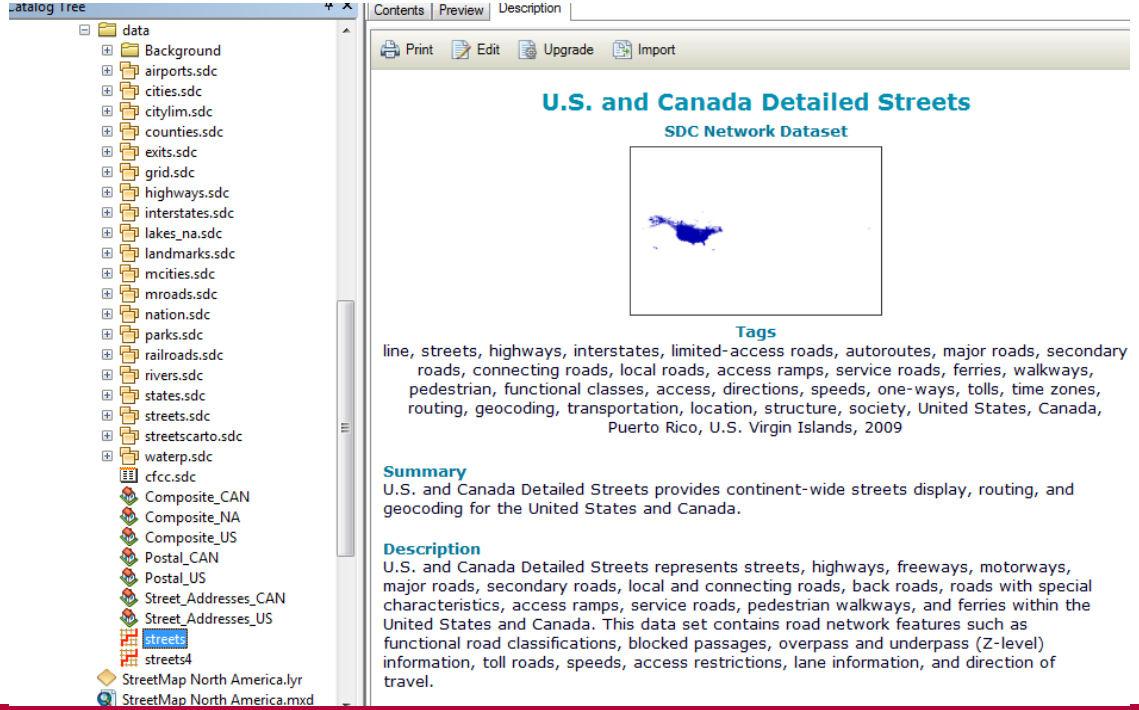
Other esri higher education site license benefits

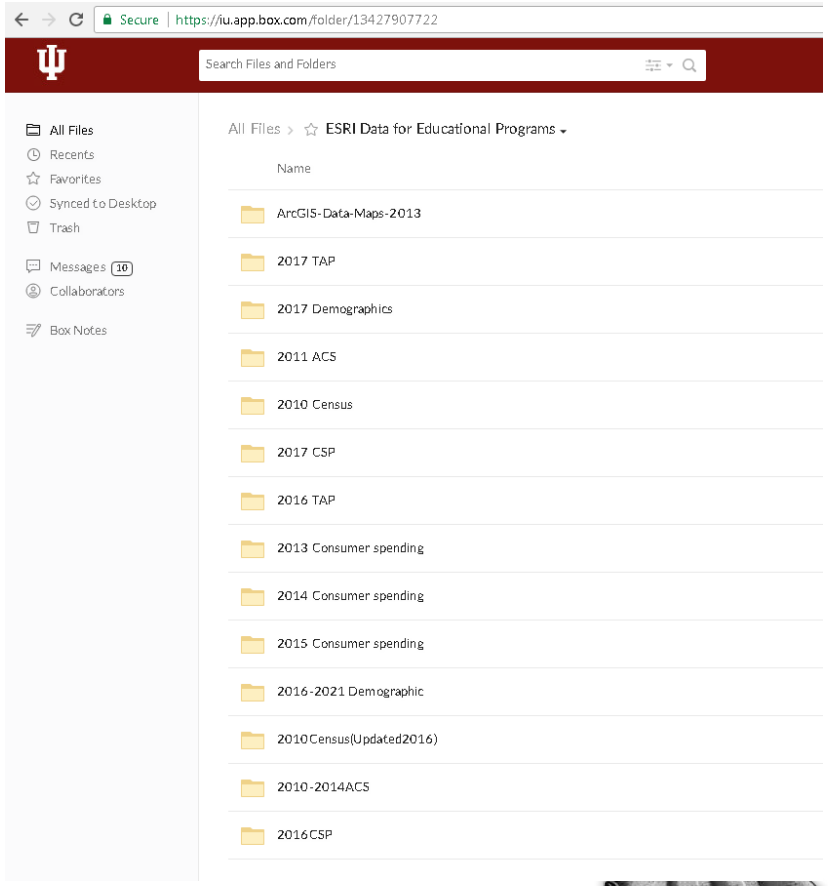
- Unlimited online training
- https://www.esri.com/training/



Other esri higher education site license benefits

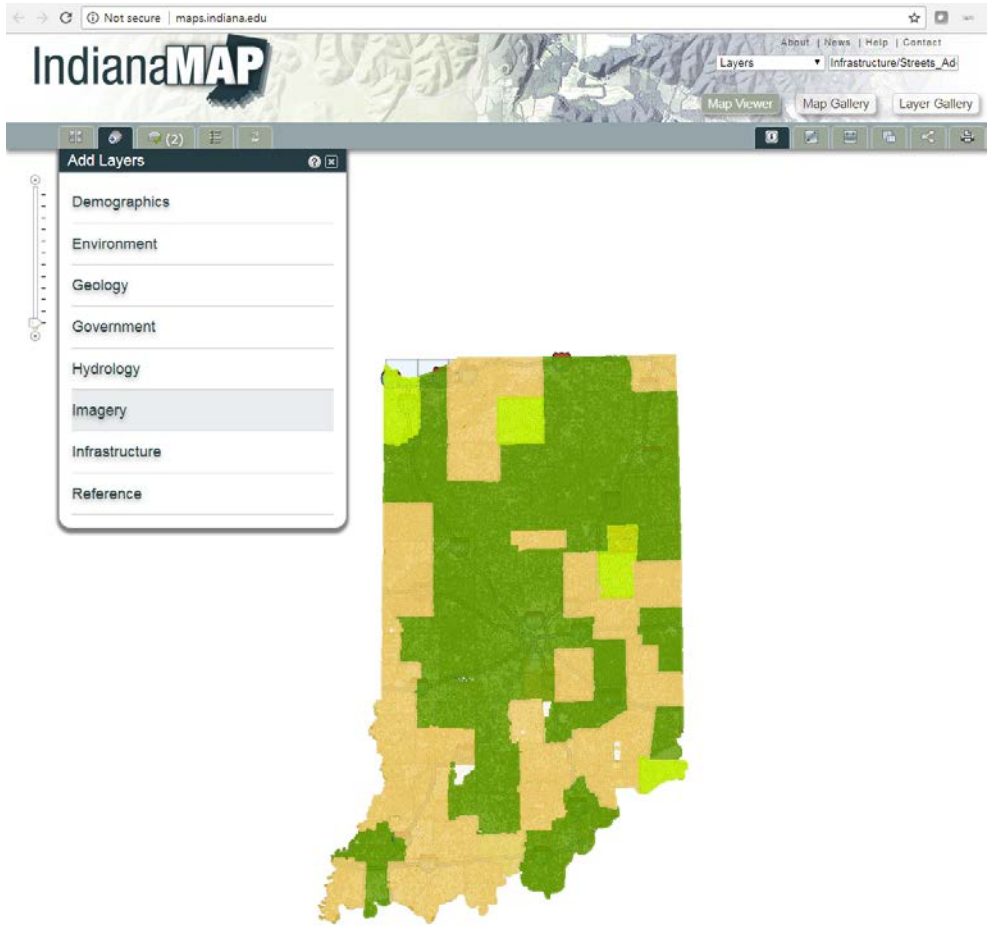
- Esri data for educational programs http://www.esri.com/data/data-maps
- Available on box with IU authentication https://iu.box.com/v/esridata
- Network dataset (routing, travel times)
- Address locators for US & NA (geocoding)
- See redistribution rights document.



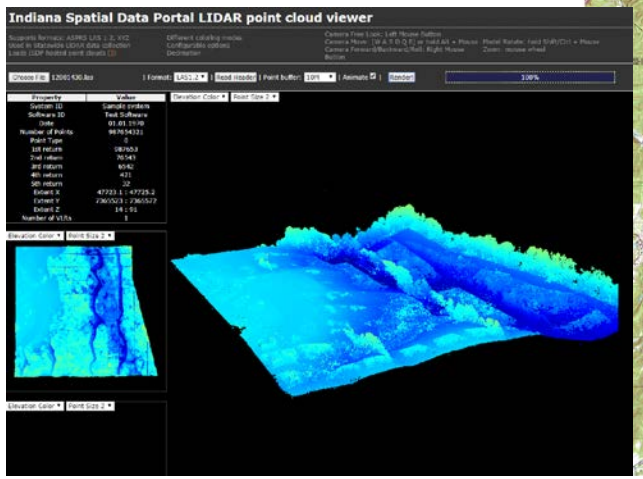


IndianaMap

- ~280 vector layers available as download or map services
- Complete metadata for each layer
- http://maps.Indiana.edu



What data is available in the ISDP (Indiana Spatial Data Portal) GIS.IU.EDU?



Multifile download tool redesign status:

Welcome jppeters@iu.edu as a registered user you can select up to 100 GB of data to stage for download
2.217 GBs/100 GB max files selected for download

Spatial Datasets within the UTM bounding coordinates of:
(539606.3349750548, 4334219.2628935445) min by (542560.6628019791, 4336450.292145378) max in meters

There are 38 available datasets.

- **Topographic Maps** description
- **2016 Orthophotography refresh** description
  - Orthophotography
    - GeoTiff
    - Metadata
- **2016 NAIP Imagery** description
  - CIR Orthophotography
    - GeoTIFF
      - m_3908652_se_16_h_20160903.tif GeoTIFF 484 MB 60 cm resolution utm_nad83 meters
    - Metadata
- **2014 NAIP Imagery** description
- **2014 Monroe County Aerial Photography** description
- **2013 IndianaMap Data** description
- **2012 National Agriculture Imagery Program (summer)** description
- **2011 IndianaMap Data** description
- **2010 National Agriculture Imagery Program (summer)** description
- **2010 Monroe County (spring)** description

Submit 2216.85 MBs of files selected for download

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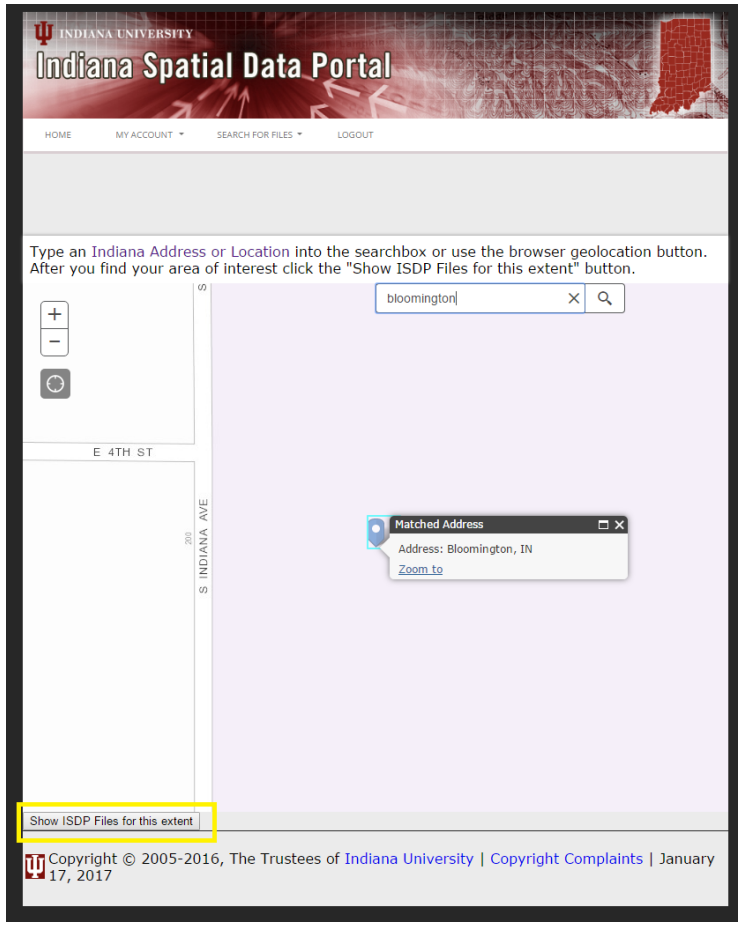
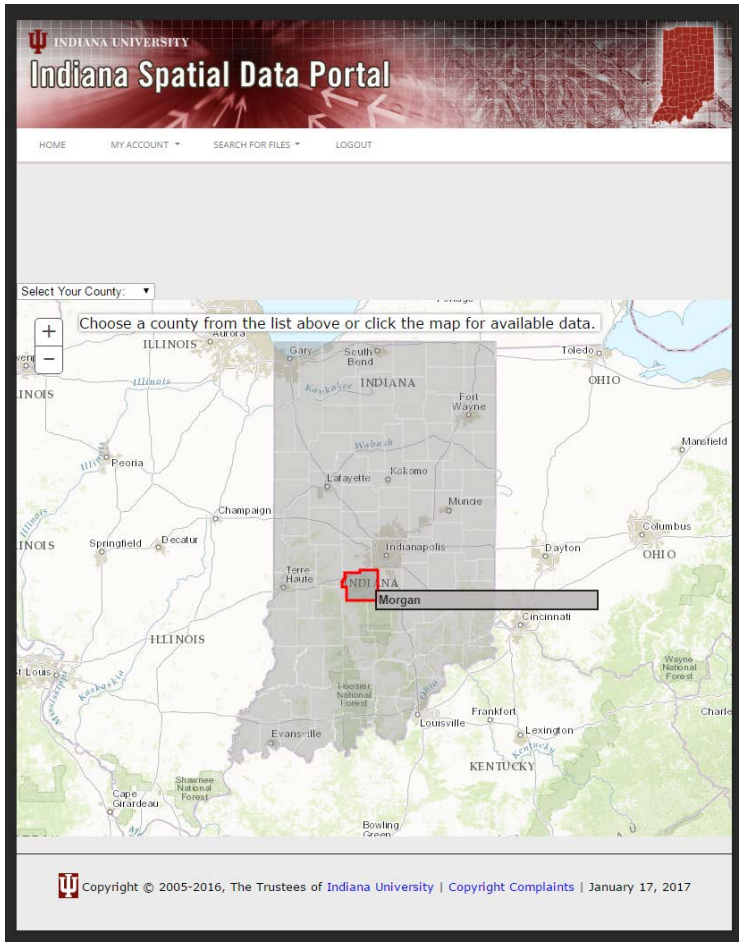
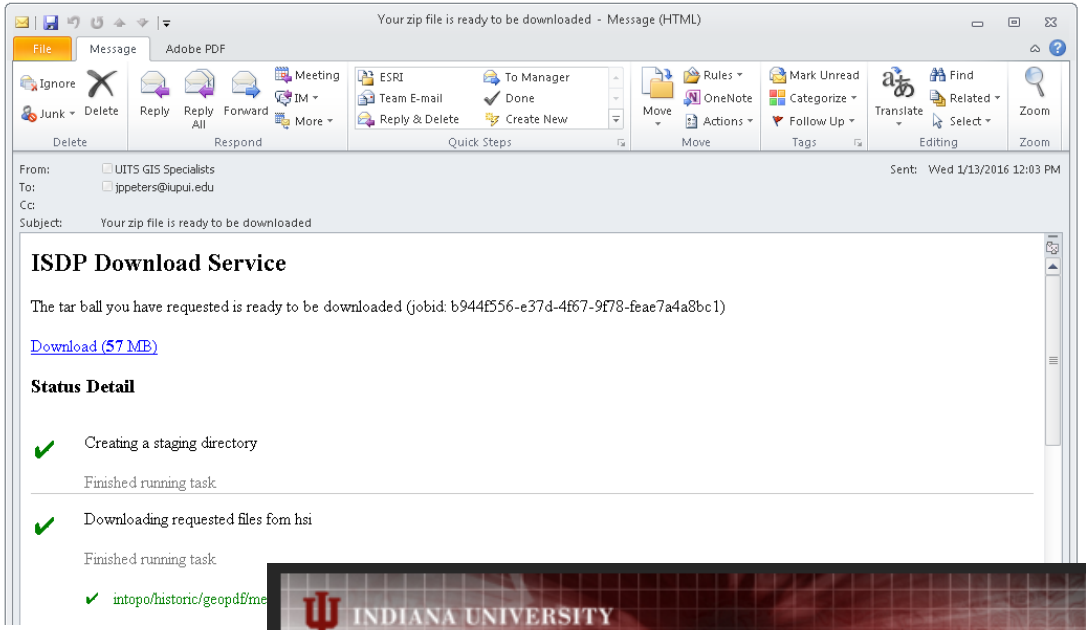
Some recent ISDP application enhancements.

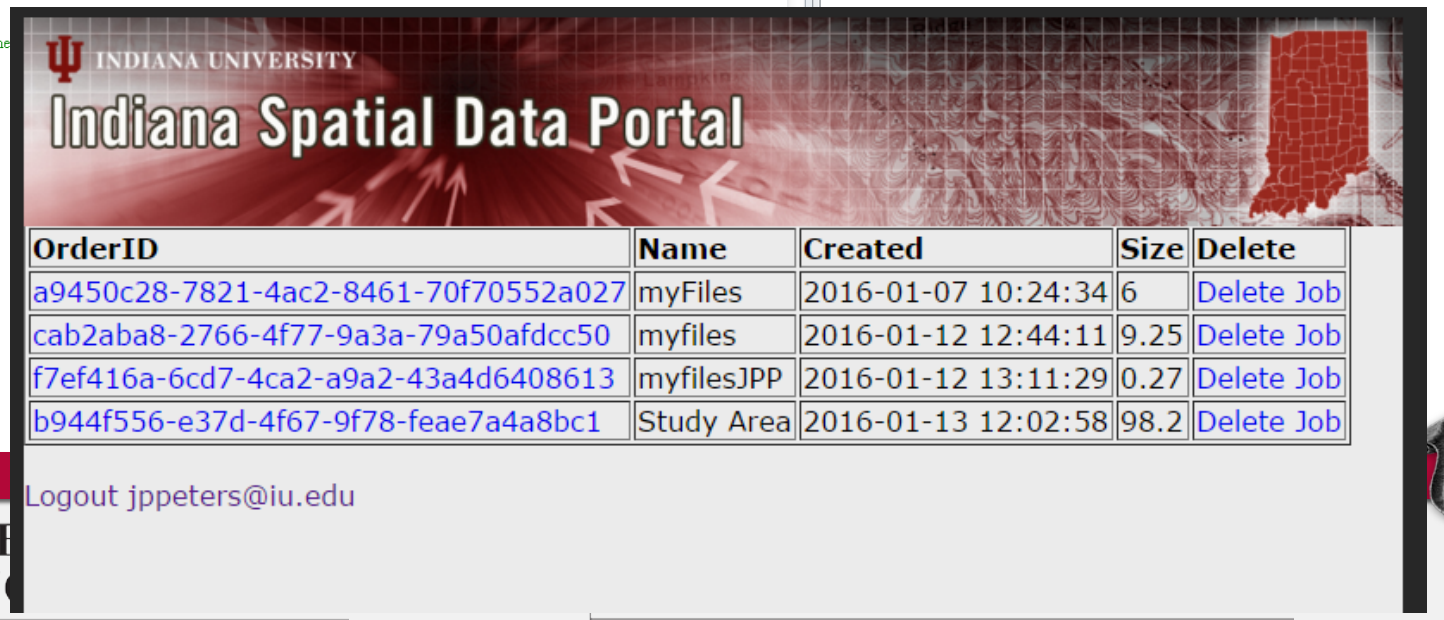




Multifile download tool redesign status:

You have successfully submitted a job with the ID of:b944f556-e37d-4f67-9f78-feae7a4a8bc1. You will receive a notification email at jppeters@iu.edu when the job is ready for download. You can also see and administer your active jobs on your active jobs page.

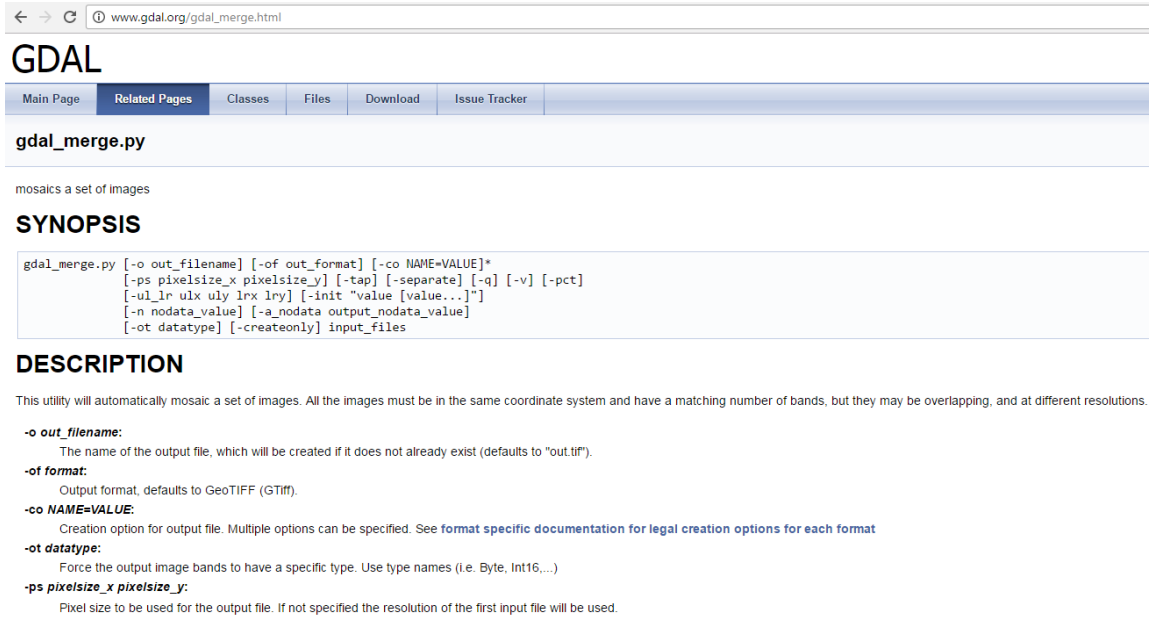




Service enhancements coming to the ISDP

Further integration of GDAL capabilities:

1. Merge (mosaic) of multiple files to one file



www.gdal.org/gdal_merge.html

GDAL

Main Page | Related Pages | Classes | Files | Download | Issue Tracker

gdal_merge.py

mosaics a set of images

SYNOPSIS

```
gdal_merge.py [-o out_filename] [-of out_format] [-co NAME=VALUE]*
              [-ps pixelsize_x pixelsize_y] [-tap] [-separate] [-q] [-v] [-pct]
              [-ul_lr ulx uly lrx lry] [-init "value [value...]"]
              [-n nodata_value] [-a_nodata output_nodata_value]
              [-ot datatype] [-createonly] input_files
```

DESCRIPTION

This utility will automatically mosaic a set of images. All the images must be in the same coordinate system and have a matching number of bands, but they may be overlapping, and at different resolutions.

-o *out_filename*:
The name of the output file, which will be created if it does not already exist (defaults to "out.tif").

-of *format*:
Output format, defaults to GeoTIFF (GTiff).

-co *NAME=VALUE*:
Creation option for output file. Multiple options can be specified. See **format specific documentation for legal creation options for each format**

-ot *datatype*:
Force the output image bands to have a specific type. Use type names (i.e. Byte, Int16,...)

-ps *pixelsize_x pixelsize_y*:
Pixel size to be used for the output file. If not specified the resolution of the first input file will be used.

Service enhancements for the ISDP

Further integration of GDAL capabilities:

2. GDAL Translate (Currently 142 image file formats)

http://www.gdal.org/formats_list.html

www.gdal.org/formats_list.html

GDAL Raster Formats

Long Format Name	Code	Creation	Georeferencing
Arc/Info ASCII Grid	AAIGrid	Yes	Yes
ACE2	ACE2	No	Yes
ADRG/ARC Digitized Raster Graphics (.gen/.thf)	ADRG	Yes	Yes
Arc/Info Binary Grid (.adf)	AIG	No	Yes
AIRSAR Polarimetric	AIRSAR	No	No
Azavea Raster Grid	ARG	Yes	Yes
Magellan BLX Topo (.blx, .xlb)	BLX	Yes	Yes
Bathymetry Attributed Grid (.bag)	BAG	No	Yes
Microsoft Windows Device Independent Bitmap (.bmp)	BMP	Yes	Yes
BPG (Better Portable Graphics)	BPG	No	No
BSB Nautical Chart Format (.kap)	BSB	No	Yes
VTP Binary Terrain Format (.bt)	BT	Yes	Yes
AutoCAD DWG Raster layer	CAD	No	Yes
CALS Type I	CALS	Yes	No
CEOS (Spot for instance)	CEOS	No	No
DRDC COASP SAR Processor Raster	COASP	No	No
TerraSAR-X Complex SAR Data Product	COSAR	No	No
Convair PolGASP data	CPG	No	Yes
USGS LULC Composite Theme Grid	CTG	No	Yes
DB2	DB2	Yes	Yes
DirectDraw Surface	DDS	Yes	No
Derived	DERIVED	No	Yes
Spot DIMAP (metadata.dim)	DIMAP	No	Yes
ELAS DIPEx	DIPEx	No	Yes
DODS / OPeNDAP	DODS	No	Yes
First Generation USGS DOQ (.doq)	DOQ1	No	Yes
New Labelled USGS DOQ (.doq)	DOQ2	No	Yes
Military Elevation Data (.dt0, .dt1, .dt2)	DTED	Yes	Yes
Arc/Info Export E00 GRID	E00GRID	No	Yes
ECRG Table Of Contents (TOC.xml)	ECRGTOC	No	Yes
ERDAS Compressed Wavelets (.ecw)	ECW	Yes	Yes
ESRI .hdr Labelled	EHdr	Yes	Yes
Erdas Imagine Raw	EIR	No	Yes
NASA ELAS	ELAS	Yes	Yes
ENVI .hdr Labelled Raster	ENVI	Yes	Yes
Epsilon - Wavelet compressed images	EPSILON	Yes	No
ERMapper (.ers)	ERS	Yes	Yes
Envisat Image Product (.n1)	ESAT	No	No
EOSAT FAST Format	FAST	No	Yes
FIT	FIT	Yes	No
FITS (.fits)	FITS	Yes	No
Fuji BAS Scanner Image	FujiBAS	No	No
Generic Binary (.hdr Labelled)	GENBIN	No	No
GeoPackage	GPKG	Yes	Yes
Oracle Spatial GeoRaster	GEORASTER	Yes	Yes
GSat File Format	GFF	No	No
Graphics Interchange Format (.gif)	GIF	Yes	No
WMO GRIB1/GRIB2 (.grb)	GRIB	No	Yes
GMT Compatible netCDF	GMT	Yes	Yes

www.gdal.org/gdal_translate.html

GDAL

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gdal_translate

converts raster data between different formats

SYNOPSIS

```
gdal_translate [--help-general]
       [-ot {Byte/Int16/UInt16/UInt32/Int32/Float32/Float64/
             CInt16/CInt32/CFloat32/CFloat64}] [-strict]
       [-of format] [-b band]* [-mask band] [-expand {gray|rgb|rgba}]
       [-outsize xsize[%]|0 ysize[%]|0] [-tr xres yres]
       [-r {nearest,bilinear,cubic,cubicspline,lanczos,average,mode}]
       [-unscale] [-scale[_bn] [src_min src_max [dst_min dst_max]]]* [-exponent[_bn] exp_val]*
       [-srcwin xoff yoff xsize ysize] [-epo] [-eco]
       [-projwin ulx uly lrx lry] [-projwin_srs srs_def]
       [-a_srs srs_def] [-a_ullr ulx uly lrx lry] [-a_nodata value]
       [-gcp pixel line easting northing [elevation]]*
       [-mo "META-TAG=VALUE"]* [-q] [-sds]
       [-co "NAME=VALUE"]* [-stats] [-norat]
       [-oo NAME=VALUE]*
       src_dataset dst_dataset
```

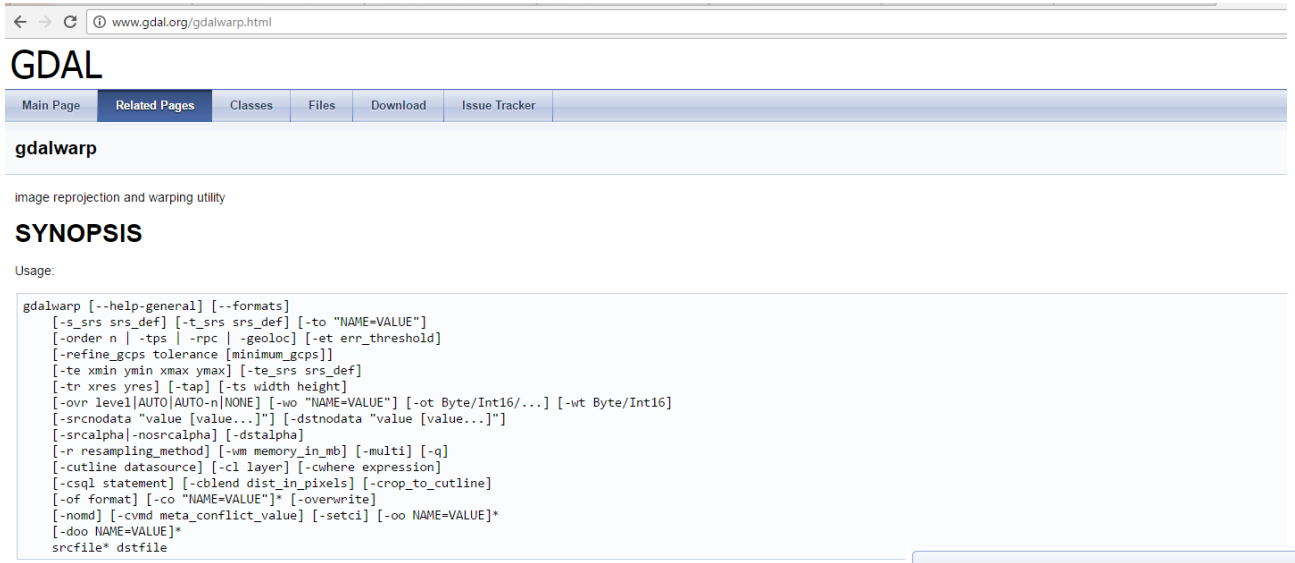
DESCRIPTION

The gdal_translate utility can be used to convert raster data between different formats, potentially performing some operations like subsettings, resampling, and rescaling pixels in the process.

Scheduled service enhancements for the ISDP

Further integration of GDAL capabilities:

3. GDAL Warp (reprojection of coordinate system)



www.gdal.org/gdalwarp.html

GDAL

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gdalwarp

image reprojection and warping utility

SYNOPSIS

Usage:

```
gdalwarp [--help-general] [--formats]
    [-s_srs srs_def] [-t_srs srs_def] [-to "NAME=VALUE"]
    [-order n | -tps | -rpc | -geoloc] [-et err_threshold]
    [-refine_gcps tolerance [minimum_gcps]]
    [-te xmin ymin xmax ymax] [-te_srs srs_def]
    [-tr xres yres] [-tap] [-ts width height]
    [-ovr level|AUTO|AUTO-n|NONE] [-wo "NAME=VALUE"] [-ot Byte/Int16/...] [-wt Byte/Int16]
    [-srcnodata "value [value...]"] [-dstnodata "value [value...]"]
    [-srcalpha|-nosrcalpha] [-dstalpha]
    [-r resampling_method] [-wm memory_in_mb] [-multi] [-q]
    [-cutline datasource] [-cl layer] [-cwhere expression]
    [-csql statement] [-cblend dist_in_pixels] [-crop_to_cutline]
    [-of format] [-co "NAME=VALUE"]* [-overwrite]
    [-nomd] [-cvmd meta_conflict_value] [-setci] [-oo NAME=VALUE]*
    [-doo NAME=VALUE]*
    srcfile* dstfile
```

DESCRIPTION

The gdalwarp utility is an image mosaicing, reprojection and warping utility. The program can reproject to any supported projection, and can also apply GCPs

OGRErr OGRSpatialReference::SetFromUserInput (const char * pszDefinition)

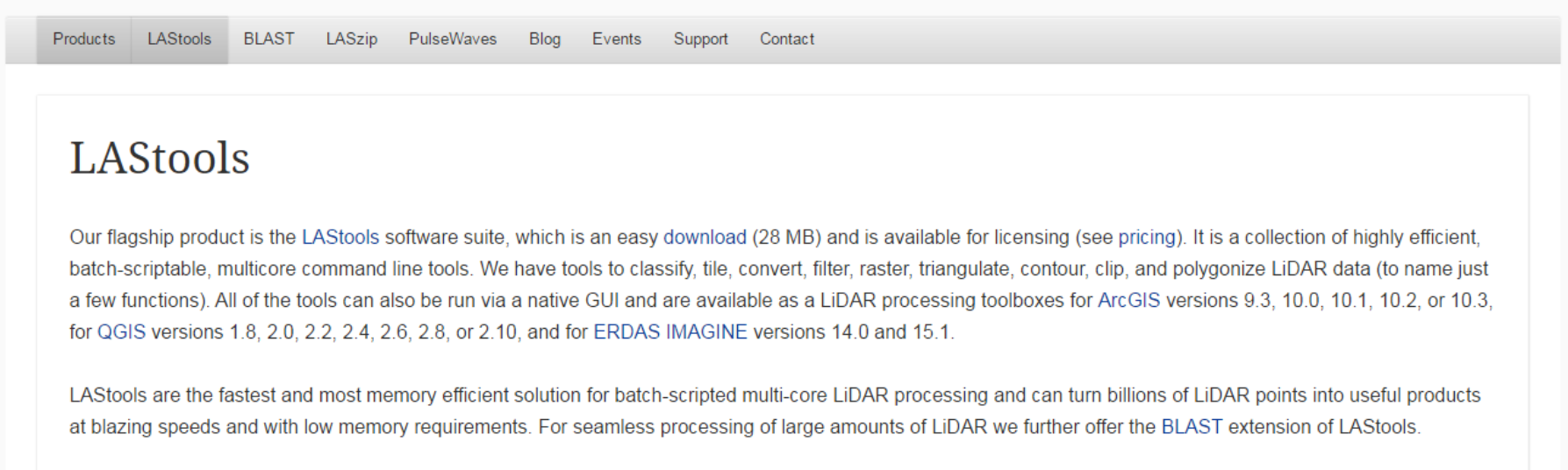
Set spatial reference from various text formats.

This method will examine the provided input, and try to deduce the format, and then use it to initialize the spatial reference system. It may take the following forms:

1. Well Known Text definition - passed on to **importFromWkt()**.
2. "EPSG:n" - number passed on to **importFromEPSG()**.
3. "EPSGA:n" - number passed on to **importFromEPSGA()**.
4. "AUTO:proj_id,unit_id,lon0,lat0" - WMS auto projections.
5. "urn:ogc:def:crs:EPSG::n" - ogc urns
6. PROJ.4 definitions - passed on to **importFromProj4()**.
7. filename - file read for WKT, XML or PROJ.4 definition.
8. well known name accepted by **SetWellKnownGeogCS()**, such as NAD27, NAD83, WGS84 or WGS72.
9. WKT (directly or in a file) in ESRI format should be prefixed with ESRI:: to trigger an automatic **morphFromESRI()**.
10. "IGNF:xxx" - "+init=IGNF:xxx" passed on to **importFromProj4()**.

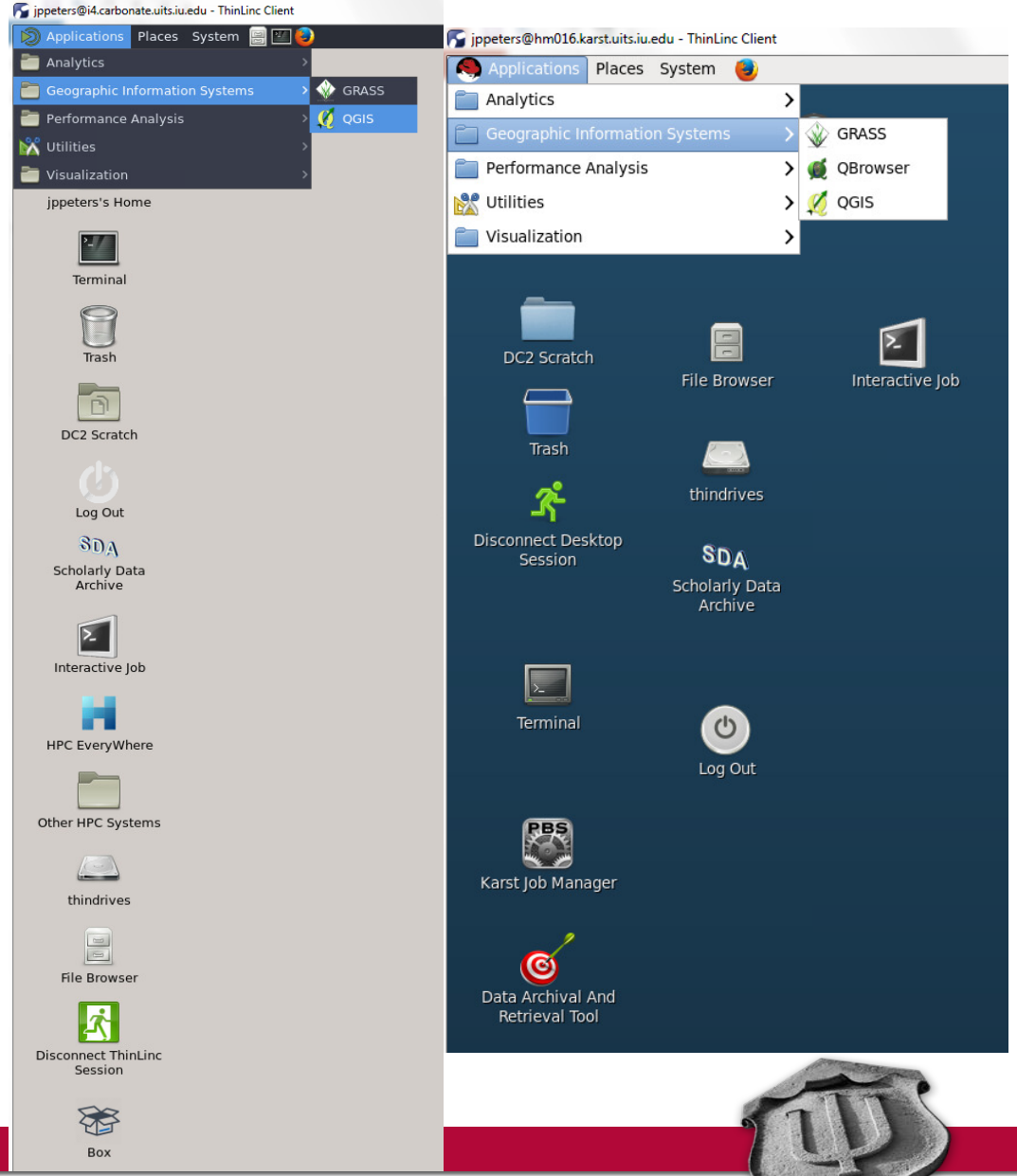
Service enhancements for the ISDP

Integration of LASTools (lasmerge, lasclip, las2dem, etc.)

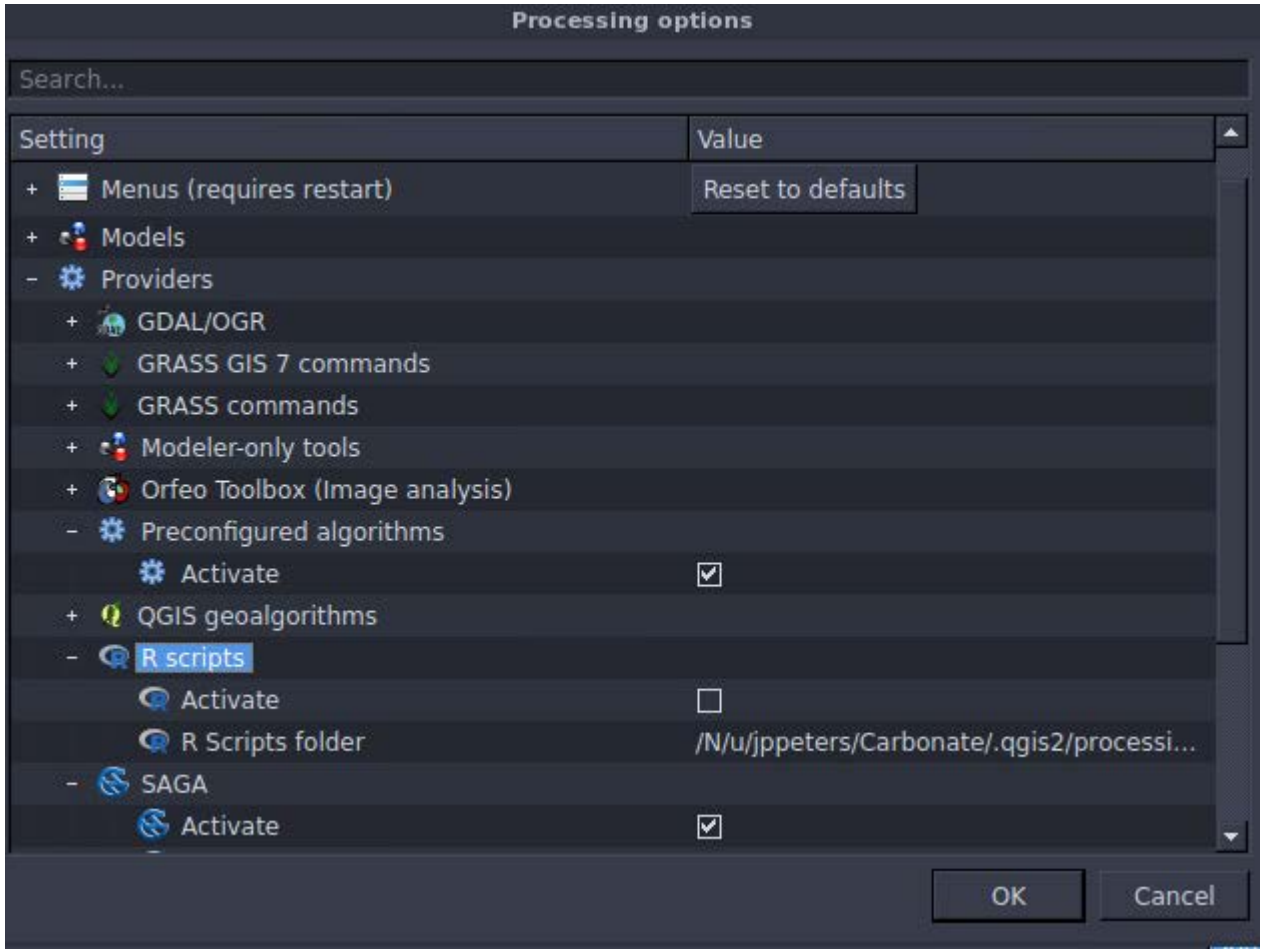


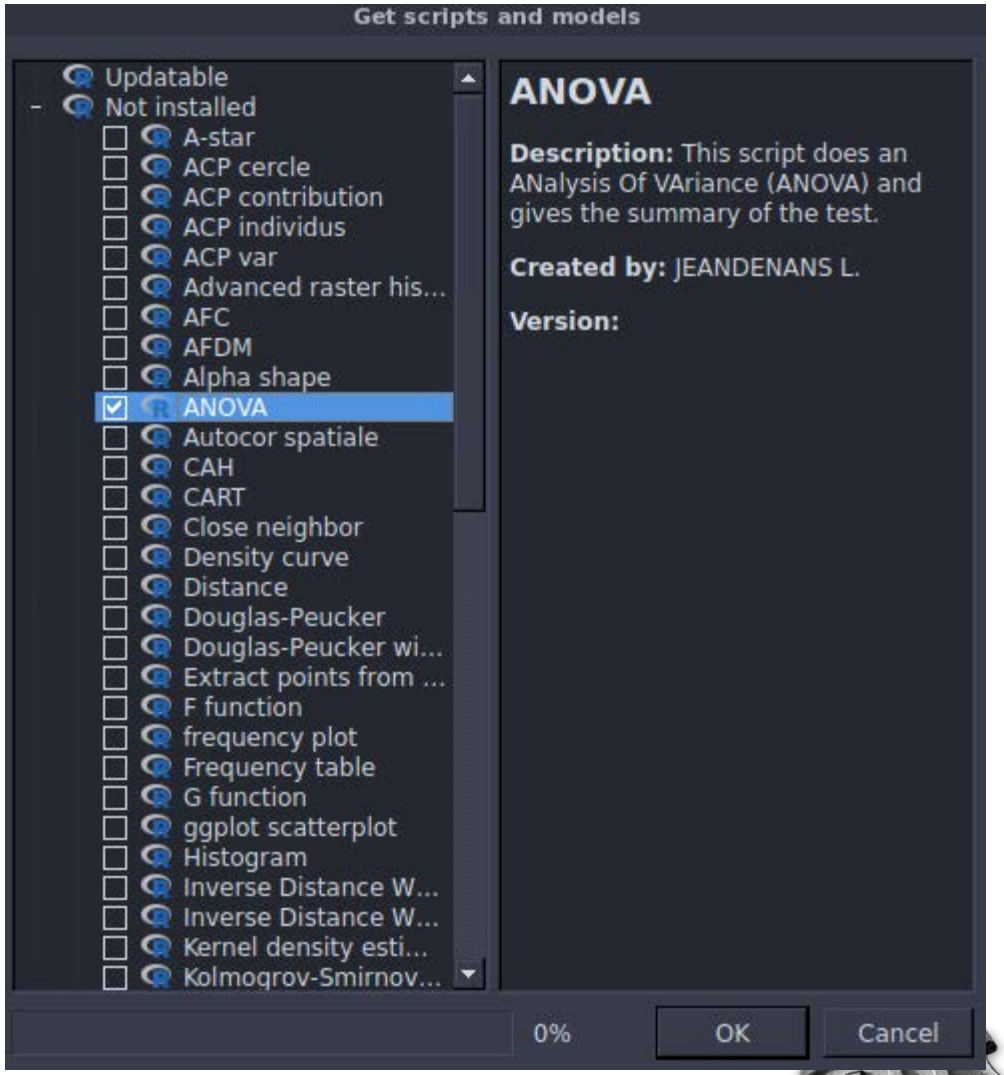
Open Source GIS software on Karst and Research Desktop

- At IU, what is Karst Desktop?
- QGIS
- GRASS GIS
- GDAL, GEOS, PROJ4, LASTOOLS



Integrating QGIS and other providers: R Scripts, Orfeo Toolbox, GRASS, SAGA TauDEM, LASTools





QGIS and the Indiana Open Geospatial data QGIS plugin